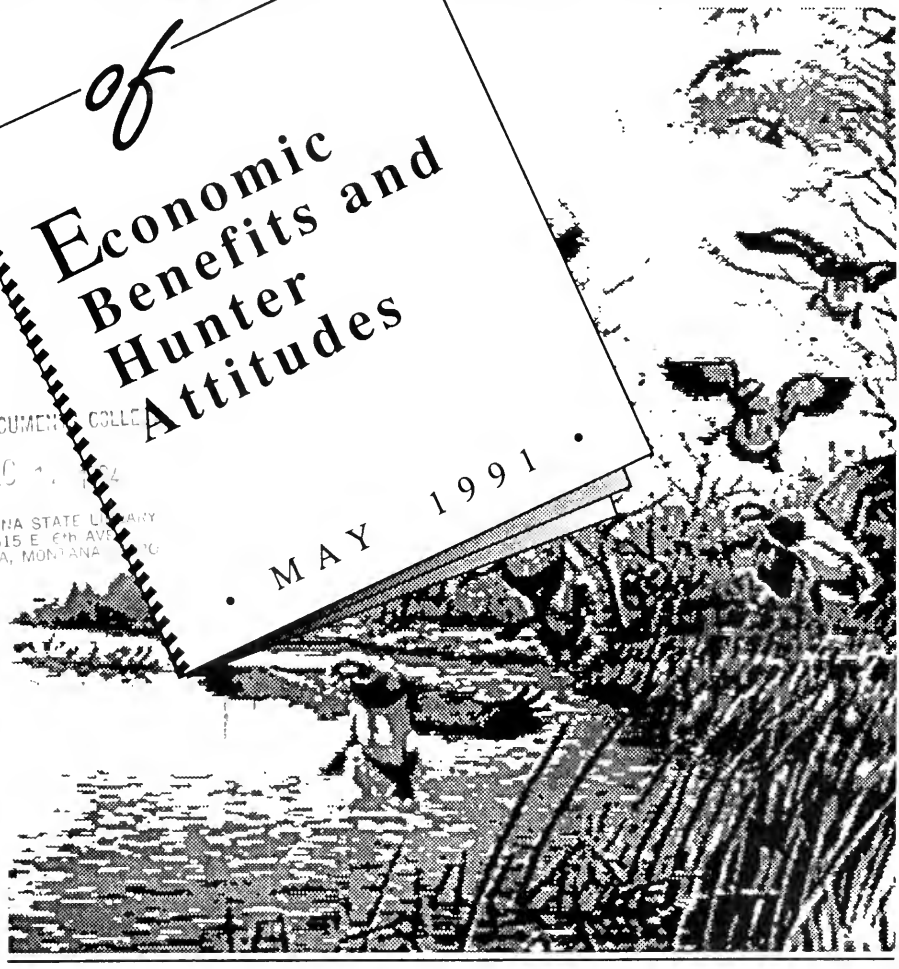
MONTANA WATERFOWL HUNTING:

A CONTINGENT VALUATION ASSESSMENT

of Economic Benefits and Hunter Attitudes

• MAY 1991 •



Montana Department of
Fish, Wildlife & Parks

MONTANA BIOECONOMICS STUDY

A CONTINGENT VALUATION ASSESSMENT OF MONTANA WATERFOWL HUNTING:

HUNTER ATTITUDES AND ECONOMIC BENEFITS

Prepared for

Montana Department of Fish, Wildlife and Parks

by

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MAJOR FINDINGS

The Basic conclusion of this report is that there are significant recreation values associated with waterfowl hunting in Montana.

Specific major findings are as follows.

-- 941 surveys were mailed and successfully delivered to hunters holding a 1989 Montana Hunting license and a 1989 waterfowl stamp. Of these, 644 were completed and returned for a response rate of 68.4%.

-- Of the 644 questionnaires returned 28 respondents either had not hunted in 1989 or returned the surveys too late to be included in the analysis. Of the 616 remaining surveys 487 were from residents and 129 were from nonresidents.

-- Of those returning surveys 37.7% hunted the Central Flyway and 62.3% hunted the Pacific Flyway.

-- Average expenditures per trip were $49.35 for residents and $635.12 for nonresidents.

-- Average expenditures per day were $30.84 for residents and $193.05 for nonresidents.

-- The mean net economic value of a Montana waterfowl hunting trip is $167.88.

-- The mean net economic value of a Montana waterfowl hunting day is $89.29.

-- There are significant differences between the net economic values per trip for residents and nonresidents.

-- There are significant differences between the net economic values per trip for the Central Flyway and the Pacific Flyway.

-- Early and late season waterfowl hunting trips do not have statistically different net economic values.

-- While a hypothetically improved trip does not have a significantly different net economic value than the current trips, a hypothetically diminished hunting experience has a significantly lower net economic value per trip than the current trip.

EXECUTIVE SUMMARY

Scope and Objectives

The primary objective of this study is to estimate the net economic value of a waterfowl hunting trip in Montana. The net economic value of a trip is the amount of money a person would be willing and able to spend for that trip over and above what they actually must spend. Estimates were made of the net economic value of a 1989 waterfowl hunting trip for the average hunter as well as for various subsamples of hunters: residents, nonresidents, Central Flyway hunters, Pacific Flyway hunters, early season trips, late season trips and hypothetically changed waterfowl hunting trips.

In addition to trip value estimates, statistics descriptive of hunter characteristics, trip characteristics and hunter management preferences were computed and are presented in Chapter III.

Data Sources

The questionnaire used in this study was administered by the Montana Department of Fish Wildlife and Parks after the 1989 general hunting season. The population targeted by the questionnaire was those people who had purchased a 1989 Montana hunting license as well as a 1989 waterfowl stamp. An adaptation of Dillman's (1978) Total Design Method was used in conducting the mail survey. Hunters first received the questionnaire booklet (see Appendix A) and cover letter along with a stamped, addressed return envelope. One week later a postcard reminder was sent to those hunters not yet responding. Finally, a second copy of the questionnaire was sent to nonrespondents three weeks after the initial mailing.

An initial sample of 1000 questionnaires was mailed to hunters. Of these, 59 were undeliverable and 644 were completed and returned. This response rate of 68.4% is comparable to other Montana hunting surveys (Loomis, Cooper and Allen, 1988; Brooks, 1988) and is quite acceptable for mail questionnaires. Of the 644 completed questionnaires, 28 either did not hunt in 1988 or were returned too late to be included in the sample.

There was no followup survey of nonrespondents conducted in this study. It is not possible, therefore, to know if the 31.6% who did not respond differed significantly from the 68.4% who did.

Descriptive Statistics

Characteristics of waterfowl hunters and the trips they took in 1989 and their opinions on waterfowl management issues are examined in Chapter III. Resident hunters drove an average of 36.7 miles on their trips and spent $49.35 per trip or $30.84 per day to hunt Montana waterfowl. Nonresidents drove an average of 468.9 miles and spent $635.12 per trip or $193.05 per day on their waterfowl hunting trips. A large portion of the Montana Waterfowl Survey dealt with questions on hunters management option preferences. A detailed presentation of responses to these questions can be found in Table 6, Chapter III.

Valuation of Waterfowl Hunting Trips

For economic modeling purposes, two contingent valuation method (CVM) questions were asked regarding a specific trip the hunter made during the 1989 waterfowl hunting season. The first question asked the hunter to place a value on either their first or last waterfowl hunting trip of the season. This question asked:

> Suppose that everything about your "FIRST" ("LAST") hunt was the same except your trip costs had been _$ X_ more, would you still have made the trip?

The hunter could answer this dichotomous choice CVM question by checking either Yes or No. The dollar amount $ X was one of 9 predetermined bid levels ranging from $ 5 to $ 500. This amount was varied randomly across questionnaires.

Analysis of responses to this question resulted in a net economic value for the entire sample of $167.88 per trip. The trip values for resident and nonresident hunters were significantly different with resident trips being valued at $126.21 and nonresident trips at $329.48. Analysis of trips to the Pacific and Central Flyways showed that the values for the two areas were significantly different with Central Flyway trips valued at $187.71 and Pacific Flyway trips at $139.68. No significant difference was found between early and late season waterfowl hunting trips.

Following the "current trip" question above was a dichotomous choice CVM question presenting hunters with hypothetical changes in either their first or last trip of the season and asking them how they would value those changes. The hypothetical question for improved hunting conditions was as follows:

> Now imagine that everything about your "FIRST" ("LAST") hunt was the same, except that you saw twice as many birds and the bag limit was more liberal, and your trip cost to visit this site increased by $ X , would you still have made the trip?

A similar question was asked regarding a decrease in hunting opportunities; "imagine that ... you saw half the number of birds and the bag limit was more conservative". The goal of asking these hypothetical question was to determine hunter's willingness to pay for alternative waterfowl hunting opportunities. As in the current trip question, the dollar amount asked varied from $5 to $500 among respondents.

Based on responses for the complete sample, the net economic value of the hypothetically "improved" trip (twice the number of birds and more liberal regulations) was not statistically different from the value of the current trip. However, the hypothetically "diminished" trip was valued significantly lower than the current trip. A detailed analysis of these estimated trip values can be found in Chapter IV.

ACKNOWLEDGMENTS

The authors would like to Rob Brooks for his excellent data management effort in survey administration and preliminary tabulation of data. Tom Hinz, Jeff Herbert and Rob Brooks of DFWP were instrumental in design of the Waterfowl Survey and provided valuable comments on early drafts of this report. Of course, responsibility for the analysis and interpretations contained herein rests solely with the authors.

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CHAPTER I

INTRODUCTION

Scope and Objectives

The main objective of this research is to statistically estimate the net economic value of waterfowl hunting in Montana. To this end, a survey of waterfowl hunting practices and views was administered to a random sample of Montana waterfowl hunters following the close of the 1989 hunting season. This survey (see Appendix A) asked hunters questions regarding travel and expenses incurred on specific waterfowl hunting trips, their views on waterfowl management issues, and values which they would place on different waterfowl hunting experiences. Answers to these survey questions were analyzed in two basic ways: (1) responses to questions on travel, expenses, views and hunter characteristics were analyzed with simple descriptive statistics such as means and proportions and (2) responses to the waterfowl hunting trip valuation questions were analyzed as dichotomous choice contingent valuation models, and trip values were estimated using logistic regression modeling.

This study examines current trip values for waterfowl hunting in Montana. Left unexamined are nonuse values for waterfowl such as viewing values or existence values. These nonconsumptive uses may constitute a sizable percentage of the total value associated with waterfowl, (Walsh et al. 1985) but estimation of these values requires the use of a general household survey and thus is beyond the scope of this study. While nonconsumptive and nonuse values are important when determining large scale impacts to resources, the current trip values, as presented in this study, may be adequate for examining the economic effect of incremental changes in waterfowl management.

Definition of Economic Benefits

Many recreationists, when asked if a specific recreational experience was worth more to them than they actually had to spend answer "yes". Net willingness to pay is the additional amount recreationists are willing to pay over and above what they actually had to pay. Therefore, net economic value or "consumer surplus" is the difference between what a person is willing to pay and what they actually must pay. This net willingness to pay is the measure of benefits associated with waterfowl hunting which is used in this study.

The U.S. Water Resources Council Principles and Guidelines (1983) require many Federal agencies to employ net willingness to pay in measuring the value of both marketed and nonmarketed (e.g.,

recreation) resources. When performing natural resource damage assessments the U.S. Department of Interior mandates the use of net willingness to pay in calculation of societal gains and losses (U.S. Department of Interior, 1986). Additionally, the Bureau of Land Management (1982) also uses net willingness to pay in measuring the economic benefits of wildlife when performing cost benefit analysis. Use of net willingness to pay in cost benefit determinations is also recommended in current economic literature (Just, Hueth and Schmitz, 1982; Sassone and Schaffer, 1978).

CHAPTER II

THEORY AND METHODS

Survey Design

The survey instrument used in this study asked a wide range of questions regarding hunting practices, views on waterfowl management issues and valuation of hunting experiences. The questions were presented in five sections (see Appendix A). These sections address the following topics:

I. Questions regarding the respondents waterfowl hunting history and their feelings toward the sport,

II. Questions about the hunters first and last waterfowl hunting trips of the 1989 season, their success and characteristics of the trips and the areas where they hunted,

III. Economic questions about a specific trip (either their first or last of the year) including expenses, travel time and contingent valuation questions,

IV. Questions designed to elicit opinions on different waterfowl hunting management options.

V. Socioeconomic questions about the respondent, including age, sex, income, education, etc.

Data gathered from all survey sections are presented in Chapter III, Descriptive Statistics, and the data collected by the contingent valuation questions of Section III is analyzed and presented in Chapter IV, Contingent Valuation Estimates of Consumer Surplus.

There were four versions of the survey sent to hunters. One half of the sample was sent surveys which addressed in parts of Sections II and III, their "first" hunting trip of the year. The other half of the sample was sent questionnaires which instead asked about their "last" hunting trip of the year. This splitting of the sample addressed a basic concern in the sampling procedure: that asking all respondents about their most current trip would bias the results if significant differences existed between early and late season trips. These two general versions of the questionnaire were also each divided into two unique versions of the survey. The surveys varied in the wording of Question 6 in Section III. One version asked respondents to

place a value on a trip in which they "saw twice as many birds and the bag limit was more liberal" and the other version asked them to value a trip in which they "saw half the number of birds and the bag limit was more conservative". These different versions were presented to facilitate valuation of alternative hypothetical management practices and trip experiences. The differences across surveys resulted in four survey versions:

(1) Surveys addressing the "first" trip and improved hunting conditions,

(2) Surveys addressing the "first" trip and worsened hunting conditions,

(3) Surveys addressing the "last" trip and improved hunting conditions,

(4) Surveys addressing the "last" trip and worsened hunting conditions.

Data Sources and Survey Administration

The questionnaire was administered by the Montana Department of Fish Wildlife and Parks after the 1989 general hunting season. The population targeted by the questionnaire was those people who had purchased a 1989 Montana hunting license as well as a 1989 waterfowl stamp. An adaptation of Dillman's (1978) Total Design Method was used in conducting the mail survey. Hunters first received the questionnaire booklet (see Appendix A) and cover letter along with a stamped, addressed return envelope. One week later a postcard reminder was sent to those hunters not yet responding. Finally, a second copy of the questionnaire was sent to nonrespondents three weeks after the initial mailing.

Response Rates

An initial sample of 1000 questionnaires was mailed to hunters. Of these, 59 were undeliverable and 644 were completed and returned. This response rate of 68.4% is comparable to other Montana hunting surveys (Loomis, Cooper and Allen, 1988; Brooks, 1988) and is quite acceptable for mail questionnaires. Of the 644 completed questionnaires, 28 either did not hunt in 1988 or were returned too late to be included in the sample.

There was no followup survey of nonrespondents conducted in this study. It is not possible, therefore, to know if the 31.6% who did not respond differed significantly from the 68.4% who did.

The Contingent Valuation Method

The remainder of this chapter is designed to present an accessible discussion of the contingent valuation method of welfare calculation and the estimation of confidence intervals around welfare estimates.

The two most widely used methods for estimating net willingness to pay for outdoor recreation are the contingent valuation method (CVM) and the travel cost model (TCM). These are also the two general methods recommended by the U.S. Water Resources Council (1983) for valuing recreation in federal cost benefit analysis.

In the CVM approach individuals are directly surveyed as to their willingness to pay for the services of a given resource contingent on the existence of a hypothetical market situation. This flexible technique has been applied to a wide range of environmental and resource issues including air and water quality changes, scenic beauty, and wildlife (Cummings, Brookshire and Schultze, 1986). The only limitation of the method is the ability of the researcher to frame understandable questions and the ability and willingness of the respondents to accurately value the good or service. Bishop and Heberlein (1985) have described six key methodological choices in a CVM application: 1) target population, 2) product definition, 3) payment vehicle, 4) question format, 5) method of analysis and 6) supplemental data. The target population for this study is the direct users of waterfowl hunting resources (Montana hunting license and waterfowl stamp holders) while the product definition is a waterfowl hunting trip.

It is necessary to specify a payment vehicle. Mitchell and Carson (1981) suggest two criteria for an appropriate vehicle: realism and neutrality. For this study increases in waterfowl hunting trip costs were used as the payment vehicle. This vehicle presented respondents with a realistic and emotionally neutral (as opposed to increases in taxes) payment method.

The question format used in the CVM in large part also determines the method of analysis to be used. The question format can be one of three basic types. First, the open-ended CVM is the simplest approach: respondents are asked their maximum willingness to pay for the use of a given resource. This approach can be administered at a low cost and is relatively easy to interpret. A widely used alternative to the open-ended format is the iterative bidding game where interviewers ask respondents for a yes or no response to a specified bid amount. If the respondent is willing to pay that amount the bid is raised in increments until the persons maximum willingness to pay is reached. Iterative bidding is a costly question format which requires face to face or telephone contact between interviewers and respondents.

A third question format, the dichotomous choice approach, combines some of the better features of both open-ended and iterative bidding. In dichotomous choice, the individual is faced with a single specific dollar bid and (like bidding games) the response is a simple market-like yes or no. The dollar bid amount is systematically varied across respondents. This format is amenable to mail surveys and is therefore relatively low cost. This relatively new approach has been successfully applied to valuation of hunting permits (Bishop and Heberlein, 1980), boating and scenic beauty (Boyle and Bishop,1984) and instream flow valuation (Duffield, Neher, Patterson and Allen, 1990) among many other applications.

In this study the dichotomous choice approach was used to value waterfowl hunting trips. Although there are advantages and disadvantages to each method, recent research shows dichotomous choice models can provide fair approximations to actual market transactions (Bishop and Heberlein, 1980; Welsh, 1986). In general, comparisons of real markets to simulated CVM markets indicate that respondents attempt to give their true value of resources being studied. A discussion of the specific CVM questions asked and the application of CVM analysis to Montana waterfowl hunting is presented in chapter IV.

Estimation of Willingness to Pay Using Dichotomous Choice CVM

The major disadvantage of the dichotomous choice method is that analysis is more complex than with open-ended or iterative bidding methods. In view of the considerable advancements in methods for modeling discrete choice (Amemiya, 1981) this complexity is manageable and acceptable when compared with the advantages which dichotomous choice CVM questions afford. These advantages include: a realistic market-like scenario and a high percentage of responses to the CVM questions.

The expected maximum willingness to pay for a waterfowl hunting trip is estimated by finding a relationship between the amount of the bid level which respondents are asked to pay and the probability of their responding yes to that amount. This estimated relationship between bid level and probability of a "yes" response can be represented graphically as 2 dimensional curve. The area under this curve (which can be calculated through integration of the curve between 0 and some chosen maximum truncation level) is called a truncated mean and is one measure of the expected maximum willingness to pay for the waterfowl hunting trip.

While the estimated maximum willingness to pay for a waterfowl hunting trip provides a great deal of information regarding the net economic value of waterfowl hunting, it is also of interest to determine how precisely estimated those willingness to pay

figures are. Because there is no analytic formula for a standard error of the truncated mean, a bootstrapping technique suggested by Duffield and Patterson (1991) was employed to estimate these standard errors.

CHAPTER III

DESCRIPTIVE STATISTICS AND HUNTER MANAGEMENT PREFERENCES

The Montana Waterfowl Survey posed many questions to hunters regarding their socioeconomic characteristics, the types of waterfowl hunting trips they took and their opinions on waterfowl management issues. The relatively large number of respondents to this survey allowed the sample to be disaggregated in several ways. Previous studies have shown significant differences between resident and nonresident recreationists (Duffield, Loomis and Brooks, 1988 and Duffield and Neher, 1990). Accordingly, the sample was divided into Montana residents and nonresidents for much of the analysis. Additionally, certain aspects of the survey responses were analyzed according to which waterfowl flyway (Pacific or Central) a hunting trip occurred in. The sizes of the samples in each of these subgroups are shown in Table 1.

Hunter Characteristics

The entire sample of 616 survey respondents was disaggregated into resident and nonresident subsamples in order to examine hunter characteristics. Table 2 shows a comparison of resident and nonresident hunter characteristics. Nonresident waterfowl hunters in this sample were, on average, older than residents (44.24 years vs. 38.67 years) and had spent more years hunting waterfowl (22.72 for nonresidents vs. 18.54 for residents). It was not surprising to see that residents spent roughly twice the number of days per year hunting in Montana that nonresidents spent. Two other major differences between resident and nonresident hunters were in the percentage of each group to belong to a sportsman's organization, and the average household income for each group. Of nonresident hunters, 63.1% belonged to a sportsman's club while only 50.3% of resident hunters did likewise. In regards to average family income, resident incomes were substantially lower ($40,333) than nonresident incomes ($56,486).

Waterfowl Hunting Trip Characteristics

Several survey questions asked respondents about characteristics of a particular waterfowl hunting trip that they had taken. A summary of responses to these questions is presented in Table 3. The major differences between trips taken by resident hunters and those taken by nonresidents can be seen in the percentage of each group to hire a guide, the average number of miles driven by each group and the average hours of driving time. While only .6% of

residents hired an outfitter or hunting guide for their particular Montana hunting trip, 10.8% of nonresident hunters did so. It was not surprising to see that nonresidents travelled much further and longer on average (468.9 miles and 10 hours) to get to their hunting area than did resident hunters (36.7 miles and 1.4 hours). In other areas the two groups of hunters were quite similar. Both walked around 1.5 miles on their hunt, and both saw an average of 3 other hunters.

It is of interest to policy makers to determine if hunters find different conditions on early and late season waterfowl hunts. Table 4 shows a comparison of trip statistics and measures of hunter success between hunters first trip of the year and their last trip of the year. An analysis of Table 4 shows that there does not appear to be a significant difference between early and late season trips, at least not in regard to the variables analyzed here.

Waterfowl Hunter Expenditures

Table 5 shows a comparison of per trip and per day expenditures for resident and nonresident hunters. Due to the greater distances which they must travel, and the necessity for overnight lodging, nonresident hunters spent substantially more per trip than did resident hunters (635.12 per trip vs. 49.35 per trip). This inequality was evident in all categories of expense; transportation, food and lodging and equipment. Nonresidents did spend more time per trip than residents (3.29 days vs. 1.60 days) and therefore the per day expense differential between residency groups was somewhat smaller than the per trip differential (193.05 per day for nonresidents vs. 30.84 per day for residents).

Waterfowl Hunter Motivations and Management Preferences

Tables 6,7 and 8 present information on the equipment used by waterfowl hunters, their motivations for choosing specific areas in which to hunt, and their reasons for engaging in waterfowl hunting.

How hunters perceive waterfowl management issues is of particular interest to waterfowl hunting policy makers. A large portion of the Montana waterfowl survey was dedicated to questioning hunters about their opinions on a variety of these issues. Table 9 presents a detailed summary of responses to these waterfowl management questions. These responses are broken down by residency class.

Table 1. Montana Waterfowl Hunting Respondents Sample and Subsample Sizes.

Hunter Grouping	Sample Size	Percentage
Resident Hunters	487	79.1%
Nonresident Hunters	129	20.9%
Total Hunters	616	100%
Central Flyway	199	37.7%
Pacific Flyway	329	62.3%
Total Hunters	528	100%

Note: The total sample sizes for the resident/nonresident breakdown and the Central Flyway/Pacific Flyway breakdown are not equal because while every respondent could be classified as resident or nonresident not every respondent indicated which flyway they had hunted on a particular trip.

Table 2. Waterfowl Hunter Characteristics by Residency Class.

Characteristic	Residents	Nonresidents
Years Hunting Waterfowl	18.54	22.72
Days Per Year Hunted	12.29	12.43
Days Hunted in Montana	13.65[1]	6.26
Average Age	38.67	44.24
Percent Male Respondents	96.1%	97.4%
Percent Belonging to a Sportsmans Organization	50.3%	63.1%
Average Family Income	40,333	56,486

1 The seeming inconsistency between the average days per year hunted by residents and the average number of days per year hunted in Montana by residents is due to respondents who answered one question but not the other.

Table 3. Waterfowl Hunting Trip Characteristics by Residency Class.

Characteristic	Residents	Nonresidents
Percent Who Hired a Guide	.6%	10.8%
Average Miles Walked	1.3	1.6
Average Number of Other Hunters Seen	3.6	3.0
Number of Years Hunting the Area	9.5	7.2
Average Miles Driven	36.7	468.9
Average Hours Driving Time	1.4	10.0

Table 4. Comparison of Characteristics of First and Last Hunting Trips.

Statistic	First Trip	Last Trip
Hunted Central Flyway	36.9%	33.1%
Hunted Pacific Flyway	63.1%	66.9%
Hours Per Day Hunted	5.2	4.8
Days Hunted on Trip	1.86	1.57
% Shooting 1 or more Ducks	65.9%	63.1%
% Shooting 1 or More Geese	37.5%	35.2%
% Shooting a Limit of Ducks	31.7%	29.4%
% Shooting a Limit of Geese	16.8%	14.3%

Table 5. Waterfowl Hunter Expenditure Statistics by Residency.

Statistic	Residents	Nonresidents
Transportation Expenses	$ 16.82	$ 266.10
Food, Beverages and Lodging	12.68	181.01
Equipment for Trip, Access, Guide Fees and all Other	19.85	188.01
Total Spent Per Trip	$ 49.35	$ 635.12
Average Number of Days Per Trip	1.60	3.29
Average Per Day Expenditure	$ 30.84	$ 193.05

Table 6. Equipment Used in Waterfowl Hunting: Percentage of Hunters Using Each Item.

Waterfowl Hunting Item	Yes Responses	Percentage
Decoys	357	64.1%
Calls	347	62.3%
Binoculars	338	60.7%
Boat	129	23.2%
Waders	293	52.6%
Tent	17	3.1%
Trailer or R.V.	38	6.8%
Camera	143	25.7%
Spotting Scope	38	6.8%
Retriever	264	47.4%

Table 7. Waterfowl Hunters Rating of the Importance of Reasons in Their Choice of a Waterfowl Hunting Area.

Reason	Very Important	Important	Not Important	Not at all Important
Good Public Access	34.0%	30.5%	20.9%	14.6%
Size of Bag Limit	10.4%	33.7%	42.3%	13.6%
High Numbers of Waterfowl	42.9%	49.1%	6.2%	1.7%
Close to Home	23.7%	42.8%	23.7%	9.7%
Availability of Facilities	5.8%	14.0%	39.1%	41.1%
Because I Had a Special Swan Permit	5.2%	4.8%	10.9%	79.2%
Proximity to Commercial Services	1.4%	4.3%	28.8%	65.5%
To Hunt with Family or Friends	35.1%	40.5%	12.2%	12.2%
Ease of Launching Boat and Bird Retrieval	9.7%	31.8%	30.2%	28.4%
Familiarity with the Area	30.7%	51.8%	13.2%	4.3%
Low Numbers of Hunters	42.5%	45.5%	10.6%	1.4%

Table 8. Waterfowl Hunter Ranking of the Importance of Reasons for Hunting Waterfowl.

Reason	Very Important	Important	Not Important	Not at all Important
For the Solitude	31.6%	50.6%	14.7%	3.1%
To test My Hunting Skills	17.4%	49.7%	26.0%	6.8%
To Shoot a Limit of Waterfowl	5.3%	18.1%	55.1%	21.5%
To be Outdoors	69.1%	29.1%	1.5%	.3%
For the Meat	8.3%	34.2%	41.2%	16.3%
To be in a Natural Setting	47.2%	46.8%	5.1%	.9%
To Learn More About Waterfowl	24.6%	51.8%	19.3%	4.3%

Table 9. Waterfowl Hunter Management Preferences by Residency.

Question/Statistic	Residents	Nonresidents
(1a) Do You Shoot Hen Mallards?		
YES	43.9%	49.1%
NO	56.1%	50.9%
(1b) If YES, Check Statements That Apply		
Shoot as part of my regular bag	17.7%	17.5%
Shoot only on slow days	56.3%	79.6%
Shoot only by mistake	17.4%	3.5%
(3) Check Statements which Reflect Your Attitudes about License Costs		
	Entire Sample	
Current duck stamp prices are adequate to maintain waterfowl numbers.	38.8%	
If duck stamp prices increased by $5 or more within 5 years, I would pay it, Knowing it was necessary to maintain waterfowl numbers.	64.8%	
If duck stamp prices increased by $5 or more within 5 years, I would quit hunting.	14.9%	
(4) In Regard to the Steel Shot Program, Check all Statements which Apply to You		
Steel shot constitutes another example of government interfering with my life/enjoyment/recreation.	33.5%	20.2%
Steel shot is necessary to reduce waterfowl losses to lead poisoning.	53.0%	54.3%
I like shooting steel shot.	13.9%	14.7%
I do not like shooting steel shot.	57.7%	51.9%
I still shoot lead shot.	7.0%	7.8%
I want to learn more about the proper use of steel shot.	31.0%	23.3%

Note: The percentages for each question may sum to greater than 100% since some questions allowed for multiple responses.

Table 9 cont. Waterfowl Hunter Management Preferences by Residency.

Question/Statistic		Residents	Nonresidents
(4) Relative to Hunting Regulations, Check Statements which Apply to You			
Present regulations are too restrictive.		18.6%	10.9%
Present regulations are in line with current population status		81.4%	89.1%
If Regulations were to be Liberalized, What Area Would You Like to See: (Please Rank 1st, 2nd and 3rd)			
Season length Increase			
	Ranked First	60.1%	58.7%
	Ranked Second	18.6%	20.0%
	Ranked Third	21.2%	21.3%
Bag limits increased			
	Ranked First	18.9%	26.7%
	Ranked Second	66.3%	66.7%
	Ranked Third	14.8%	6.6%
Other			
	Ranked First	14.2%	9.3%
	Ranked Second	9.2%	7.0%
	Ranked Third	76.6%	83.7%
(5) Do you perceive there are fewer ducks in your area, and if so, to what do you attribute it? (Check all statements you feel are very important)			
Habitat loss nationally		56.1%	65.9%
Habitat loss in my state/area		38.2%	40.3%
Overshooting		10.9%	12.4%
Disease		8.2%	14.7%
Toxic substances		26.5%	36.4%
If you do not plan to hunt waterfowl in one or more upcoming seasons, will you continue to buy duck stamps?			
YES		54.5%	69.4%

Note: The percentages for each question may sum to greater than 100% since some questions allowed for multiple responses.

Table 9 cont. Waterfowl Hunter Management Preferences by Residency.

Question/Statistic		Residents	Nonresidents
(7) Please check the statements which reflect your attitudes about half-hour before sunrise shooting (HHBSRS) for ducks and geese:			
HHBSRS is an important part of my waterfowl hunting tradition (percent responding yes)			
	Ducks	53.2%	48.7%
	Geese	52.2%	38.9%
HHBSRS is necessary to a successful day's hunt, at least some days			
	Ducks	50.0%	45.1%
	Geese	46.6%	33.6%
HHBSRS is necessary to an enjoyable day of hunting			
	Ducks	33.0%	31.9%
	Geese	31.1%	23.9%
HHBSRS is unimportant to me in hunting			
	Ducks	27.4%	33.6%
	Geese	25.1%	28.3%
HHBSRS should be curtailed since hunters cannot see birds well enough for proper identification			
	Ducks	17.2%	23.0%
	Geese	7.0%	15.9%
HHBSRS should be curtailed to reduce the harvest of some species which need more protection			
	Ducks	14.3%	21.2%
	Geese	6.2%	12.4%

CHAPTER IV

CONTINGENT VALUATION ESTIMATES OF CONSUMER SURPLUS

Contingent Valuation Questions Asked

The Montana Waterfowl Hunting Survey asked hunters to answer questions on a number of aspects of their most recent hunting trip. For economic modeling purposes, two contingent valuation questions were asked regarding a specific trip the hunter made during the 1989 waterfowl hunting season. The first question asked the hunter to place a value on either their first or last waterfowl hunting trip of the season. This question asked:

> Suppose that everything about your "FIRST" ("LAST") hunt was the same except your trip costs had been _$ X_ more, would you still have made the trip?

The hunter would answer this dichotomous choice CVM question by checking either Yes or No. The dollar amount $ X was one of 9 predetermined bid levels ranging from $ 5 to $ 500. This amount was varied randomly across questionnaires.

Following this question was a dichotomous choice CVM question presenting hunters with hypothetical changes in either their first or last trip of the season and asking them how they would value those changes. This hypothetical question was as follows:

> Now imagine that everything about your "FIRST" ("LAST") hunt was the same, except that you saw twice as many birds and the bag limit was more liberal (or you saw half the number of birds and the bag limit was more conservative), and your trip cost to visit this site increased by _$ X_, would you still have made the trip?

The goal of asking this hypothetical question was to determine hunters willingness to pay for alternative waterfowl hunting opportunities. As in the current trip question, the dollar amount asked varied between $ 5 and $ 500 among respondents.

Outlier and Protest Responses

In the analysis of CVM responses there are two groups of respondents who should be excluded from the sample before any analysis occurs. The first is that group who indicate a willingness to pay the stated bid amount but who would not actually be able to pay that amount given their income. The standard economic definition of demand requires both a willingness and an ability to pay. Therefore those respondents who indicate a willingness but lack the ability to pay the bid

amount must be excluded as their response does not meet the constraints of economic theory. Ability to pay was determined by first calculating the percentage of their income which respondents were willing to spend on waterfowl hunting. This was done as follows:

$$PERCENT = \frac{((TOTAL + BID) * TRIPS)}{INCOME} \quad (1)$$

Where:
TOTAL = The amount they reported spending on their most recent trip.
BID = The dollar bid level asked.
TRIPS = The number of separate waterfowl hunting trips they reported taking this season.
INCOME= Their reported annual income.

This percentage statistic was calculated for the first CVM question. As an initial measure all respondents with a percentage figure greater than 1 were excluded since this group most obviously lacks the ability to pay. The percentages for the remaining respondents were then tabulated. Since the distribution of the calculated variable PERCENT was somewhat skewed rather than distributed normally a three standard deviation confidence interval was placed around the calculated mean in order to determine the cutoff limit for outlier exclusion. In total, 17 observations were eliminated from the following economic analysis due to a reported willingness to pay which exceeded the cutoff limits.

The second group of respondents who were excluded from the analysis were those whose responses reflected a "protest" to some aspect of the simulated market. The U.S. Water Resources Council has suggested that a followup question be asked to each CVM question. In this survey that question was : "If no, would you have made the trip if your share of the expenses had been only $1 more? Following the "No" response to this question was: "if no, could you briefly explain why not." The responses to these questions were analyzed to develop categories of reasons for responding with a "No". Those hunters who indicated a valid reason for their zero willingness to pay were left in the sample. These valid reasons included:

* Respondents who could not afford a higher trip cost.
* Respondents saying they would hunt elsewhere if faced with increased trip costs.
* Respondents who indicated that the trip would just not be worth any more money.

Respondents were excluded from the sample if their reasons for responding "no" indicated they were protesting the market setup rather than legitimately considering the question which was asked. These "protest" responses included:

* Respondents saying they didn't understand the questions.
* Respondents indicating opposition to any increased taxes, or fees.

In total, 13 responses were excluded from the analysis because their responses were deemed to be protests.

Model Specification and Estimated Equations

The net economic value for a waterfowl hunting trip was determined by analyzing the respondents' yes or no answers to the CVM questions. These responses were analyzed using logistic regression. A more comprehensive discussion of the theory and methods for analyzing these types of models is provided in Duffield and Patterson (1991).

Economic theory suggests that certain variables should influence the response of an individual to a CVM question. In this study, a bivariate form of the willingness to pay model was used which regressed "yes" or "no" responses upon the bid amount asked. It is expected that as bid increases, the probability of a "yes" response will decrease.

The following bivariate logit model was used for the CVM questions:

$$\ln\left(\frac{P}{1-P}\right) = \alpha + \beta \ln(BID) \qquad (2)$$

where: P = Probability of a "yes" response
BID = Dollar amount of increased trip costs the respondent was asked to pay

The estimated coefficients and standard errors for the model shown in Equation 2 are shown in Tables 10-13 . In all cases, the coefficients for the independent variable (ln(BID)) had the expected sign (negative) and added significantly to the model at the .05 level. These results indicate the responses are logical and consistent with economic theory.

An analysis of the goodness of fit statistics for the 9 estimated models show that all but 2 of the logistic models fit the data well. This indicates that the choice of the double log functional form shown in Equation 2 is generally consistent with the distribution of the sample data. Goodness of fit statistics for all models are reported in Tables 10-13.

Benefit Estimation

Two measures of benefit per trip were calculated from the bivariate logit models and are presented in Tables 14-16. They are the median and the truncated mean. The truncation point used for the truncated mean was the maximum bid--$500 for all aggregation levels. The truncated mean was calculated by numerical evaluation of the integral shown in Equation 3 since this integral cannot be evaluated analytically for the model with log(bid) as the independent variable.

$$Truncated\ Mean = \int_0^T (1 - F(x))\ dx \qquad (3)$$

Where: $F(x)$ is the probability density function of the willingness to pay distribution.

It should be noted that use of the truncated mean represents a conservative estimate of the true (hypothetical) mean willingness to pay because all individuals having willingness to pay greater than T are included at the value T.

The second welfare measure presented in Tables 14-16 is the median of the willingness to pay distribution. The median is defined as the point where 50% of the sample would say "Yes" to the bid. The median is analytically defined as:

$$Median = \exp\left(-\frac{\alpha}{\beta}\right) \qquad (4)$$

Both truncated mean and median are reported as there is currently a debate in the economics literature as to which measure is most appropriate. Duffield and Patterson (1991) argue that the truncated mean is best used since it, unlike the median, can be aggregated over the whole population.

Standard errors for the medians and truncated means were estimated by bootstrapping with 200 replications. This statistical procedure is described in Duffield and Patterson (1991). Bootstrapping was used because there is no analytic formula for a standard error of the truncated mean. Although an approximate asymptotic formula exists for the standard error for the median, bootstrapping will probably give a more reliable estimate, particularly for small samples.

Four specific aggregation schemes are presented in Tables 14-16. These different aggregations test the *a priori* assumptions that the following differences exist:

(1) That residents and nonresidents exhibit different current trip net economic values,

(2) That trips to the Central and Pacific Flyways will exhibit differing values,

(3) That early and late season (first and last) trips will show differing net economic values,

(4) That trips with hypothetically changed conditions (Twice the birds and more liberal regulations, or half the birds and more conservative regulations) will have net economic values which differ from the current trip values.

Table 14 shows the estimated values for hunters current trip (an actual specific trip which the hunters made during the season) for the entire sample as well as for resident and nonresident subsamples. As would be expected, nonresident values per trip (329.48) were significantly higher than resident values (126.21). When adjusted for the different average length of trips taken by the two groups nonresident values remained higher at $100.15 per day vs. $78.88 per day for residents.

One interesting figure shown in Table 14 is the median trip value and standard error for the nonresident subsample. While measures of the median of CVM distributions tend to be significantly lower than measures of mean willingness to pay, this particular model shows just the opposite. The reason for this anomaly is that even at the highest bid level asked ($500) nearly 50% of the nonresidents responded "yes" as to their willingness to pay that amount. The effect of this is that the Truncated mean WTP was <u>extremely</u> conservatively estimated while the median was accurately estimated. Since the variance of the median estimate is based in a large part upon the unobserved upper tail of the distribution, while the median is accurately estimated its variance is very imprecisely estimated.

Table 15 shows a comparison of WTP estimates for Central and Pacific Flyway trips as well as for first and last trips of the season. Waterfowl hunting trips to the Central Flyway were valued higher than those to the Pacific Flyway (187.71 vs. 139.68 respectively). No such clear cut difference could be found, however, between first and last trips of the season (171.08 vs. 165.23 respectively). Table 16 shows an initial comparison between the aggregated current trip values and the estimated values for hypothetically improved and hypothetically diminished trips. Both hypothetical trip values are lower than the current trip value of 167.88. The improved trip scenario shows a value which is slightly lower (151.36) while the diminished trip shows a value which is significantly lower (112.72).

In order to give meaning to the relationships presented in Tables 14-16 a statistical comparison of the truncated mean values was done. The results of this comparison are shown in Table 17. Of the four comparisons made in this analysis (resident vs. nonresidents, Central vs. Pacific, first trip vs. last trip, and changed conditions vs. current conditions) in three cases there proved to be significant differences between the estimated mean per trip values. Nonresident current trip values, as expected, were significantly higher than resident values; Trips to the Central Flyway were valued significantly higher than those to the Pacific Flyway; Trips with hypothetically diminished conditions were valued significantly lower than the current conditions trips as well as the improved conditions trips. The estimated mean values for first and last trips were not significantly different. Likewise, there was no statistical difference between current conditions trips and hypothetically improved conditions trips.

In an effort to further examine the possible difference between early and late season trips, the date of the current trip was analyzed and responses were divided into two groups: those respondents asked about their first trip whose trip date was before 11/01/89 and those asked about their last trip whose trip date was after 12/01/89. This clear division of early and late trips was examined because a large number of respondents (nearly 33%) made only one hunting trip for the year and thus their responses to first or last trip questions could not be expected to fall neatly into early and late season categories. Analysis of this new breakdown of early and late trips showed that while differences in current trip values were more marked than for the first and last trip analysis, there was still no statistical difference at the 90% level of significance between the estimated logit means.

Table 10. Estimated Bivariate Logistic CVM Equations, Entire Sample and Resident and Nonresident Subsamples.

Model/Statistic	Intercept (T-Stat.)	log(BID) (T-Stat.)
Entire Sample	4.1802 (9.68)	-.9411 (-10.1)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 13.7 P = .0568 Sample Size = 531		
Resident Subsample	4.5950 (9.26)	-1.1192 (-10.0)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 11.3 P = .1253 Sample Size = 430		
Nonresident Subsample	4.9851 (3.52)	-.8079 (-2.92)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 8.80 P = .2676 Sample Size = 101		

Table 11. Estimated Bivariate Logistic CVM Equations, Pacific and Central Flyways.

Model/Statistic	Intercept (T-Stat.)	log(BID) (T-Stat.)
Pacific Flyway Subsample	3.9888 (7.06)	-.9656 (-7.66)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 9.40 P = .2252 Sample Size = 295		
Central Flyway Subsample	5.0649 (6.06)	-1.0709 (-6.03)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 5.68 P = .5774 Sample Size = 178		

Table 12. Estimated Bivariate Logistic CVM Equations, First and Last Trips of the Season.

Model/Statistic	Intercept (T-Stat.)	log(BID) (T-Stat.)
First Trip Subsample	4.4055 (6.95)	-.9780 (-7.09)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 3.46 P = .8392 Sample Size = 256		
Last Trip Subsample	3.9244 (6.68)	-.8971 (7.07)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 18.46 P = .0100 Sample Size = 273		

Table 13. Estimated Bivariate Logistic CVM Equations, Changed Conditions Trips.

Model/Statistic	Intercept (T-Stat.)	log(BID) (T-Stat.)
Twice as many birds and more liberal regulations	3.5079 (5.89)	-.8452 (-6.61)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 4.92 P = .6702 Sample Size = 262		
Half as many birds and more conservative regulations	2.0876 (4.32)	-.6538 (-5.87)
Likelihood Ratio Goodness of Fit Test		
Degrees of Freedom = 7 Chi Square = 15.84 P = .0266 Sample Size = 272		

Table 14. Montana Waterfowl Hunting Net Economic Values Per Trip and Per Hunter Day: Entire Sample and Residency Subsamples.

Model	Sample Size	Truncated Mean	Median
Net Economic Value Per Trip			
Entire Sample	531	167.88	84.93
(Standard Error)		(11.44)	(9.37)
Resident Subsample	430	126.21	60.68
		(10.53)	(6.08)
Nonresident Subsample	101	329.48	478.40
		(28.85)	(1054.81)
Net Economic Value Per Day			
Entire Sample	531	89.29	45.17
Resident Subsample	430	78.88	37.93
Nonresident Subsample	101	100.15	145.41

Note: The truncation point for the mean value estimates was the maximum bid level ($500). Standard errors are from bootstrap procedure with 200 repetitions.

Days per trip for subsamples are as follows:

Entire Sample..... 1.88
Resident Subsample 1.60
Nonresident Subsample ... 3.29

Table 15. Montana Waterfowl Hunting Net Economic Values Per Trip: by Flyway and by First or Last Trip of Year.

Model	Sample Size	Truncated Mean	Median
Entire Sample Broken Down By Flyway			
Central Flyway	178	187.71	113.25
(Standard Error)		(19.11)	(18.42)
Pacific Flyway	295	139.68	62.23
		(14.46)	(8.82)
Entire Sample Broken Down By First Or Last Trip Of Year			
First Trip of Year	256	171.08	90.43
		(16.02)	(13.74)
Last Trip of Year	273	165.23	79.40
		(15.35)	(12.89)

Note: The truncation point for the mean value estimates was the maximum bid level ($500).

Table 16. Comparison of Net Economic Values Per Trip of Current Trip and Hypothetical trips.

Model	Sample Size	Truncated Mean	Median
Current Trip Model			
Entire Sample	531	167.88	84.93
(Standard Error)		(11.44)	(9.37)
Hypothetical Trip Models			
Twice the number of birds and more liberal regulations	262	151.36 (12.97)	63.46 (10.63)
Half the birds and more conservative regulations	272	112.72 (13.05)	24.36 (6.31)

Note: The truncation point for the mean value estimates was the maximum bid level ($500).

Table 17. Comparison of Differences Across Contingent Valuation Means.

Model Comparison (Mean 1 vs. Mean 2)	Mean 1 (Std.Err)	Mean 2 (Std.Err)	T-Stat
Residents vs. Nonresidents	126.21 (10.53)	329.48 (28.85)	-6.619**
Central vs. Pacific	187.71 (19.11)	139.68 (14.46)	2.004*
First vs. Last	171.08 (16.02)	165.23 (15.35)	.264
Twice vs. Half	151.36 (12.97)	112.72 (13.05)	2.100*
All vs. Twice	167.88 (11.44)	151.36 (12.97)	.955
All vs. Half	167.88 (11.44)	112.72 (13.05)	3.178**

* Means are significantly different at a 95% level of confidence.

** Means are significantly different at a 99% level of confidence.

Note: Model definitions are as follows:

Resident = Current trip question, Resident subsample
Nonresident= Current trip question, Nonresident subsample
Central = Current trip question, Central Flyway subsample
Pacific = Current trip question, Pacific Flyway subsample
First = Current trip question, First trip subsample
Last = Current trip question, Last trip subsample
Twice = Hypothetical trip question, Twice the number of Birds and more liberal regulations subsample
Half = Hypothetical trip question, Half the number of birds and more conservative regulations subsample
All = Current trip question, Entire sample

Note: T-Statistics are calculated as follows: $T\text{-}Stat = \frac{Mean_1 - Mean_2}{\sqrt{Var_1 + Var_2}}$

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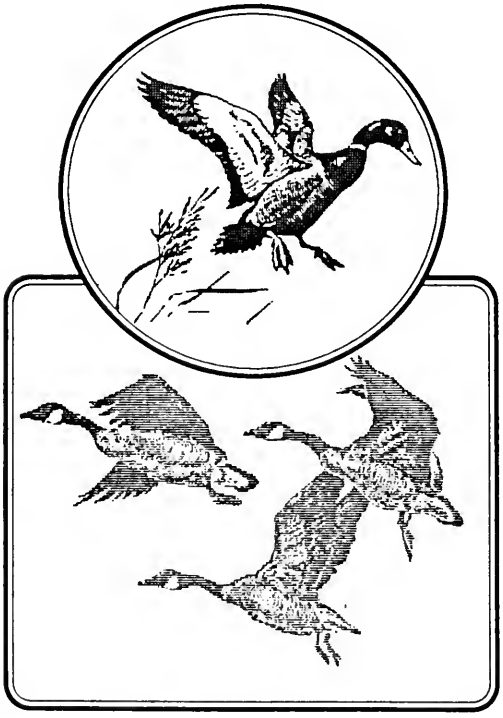
Appendix A: Survey Instrument

MONTANA
WATERFOWL SURVEY
1990



I. *FIRST, WE HAVE SOME GENERAL QUESTIONS ABOUT YOUR WATERFOWL HUNTING.*

1. How many years have you been hunting waterfowl? _____ Years

2. About how many days per year do you hunt waterfowl? _____ Days

3. How many of these were spent waterfowl hunting in Montana? _____ Days

4. How would you rate waterfowl hunting compared to your other outdoor recreation activities? (please check one)

   _____ It's my favorite outdoor recreation activity
   _____ It's one of my favorite outdoor recreation activities
   _____ It's just one of several outdoor recreation activities that I do
   _____ I prefer other outdoor recreation activities

II. *THE NEXT QUESTIONS ASK ABOUT YOUR "FIRST" AND "LAST" WATERFOWL HUNTING TRIPS IN MONTANA DURING THE 1989 SEASON?*

1. Dates of your "FIRST" trip: _____
   Dates of your "LAST" trip: _____

2. Use the map provided to determine which flyway you hunted in on your:

"FIRST" trip: Central Flyway _____ Pacific Flyway _____
"LAST" trip: Central Flyway _____ Pacific Flyway _____

3. On your "FIRST" trip, how many days did you hunt? _____ Days
   On your "LAST" trip, how many days did you hunt? _____ Days

4. About how many hours per day did you hunt on your "FIRST" trip?
   _____ Hours

   4a. About how many hours per day did you hunt on your "LAST" trip?
   _____ Hours

5. What type of area did you hunt (river, stream, pond, land, field, drainage ditch)?
   on your "FIRST" trip _____
   on your "LAST" trip _____

6a. On your "FIRST" trip, did you shoot one or more:

Ducks: _____ Yes _____ No
Geese: _____ Yes _____ No

6b. On your "LAST" trip, did you shoot one or more:

Ducks: _____ Yes _____ No
Geese: _____ Yes _____ No

7a. Did you shoot a limit of ducks or geese on your "FIRST" trip of the waterfowl season?

Limit of ducks _____ Yes _____ No
Limit of geese _____ Yes _____ No

7b. Did you shoot a limit of ducks or geese on your "LAST" trip of the waterfowl season?

Limit of ducks _____ Yes _____ No
Limit of geese _____ Yes _____ No

THE FOLLOWING QUESTIONS REFER TO YOUR "FIRST" TRIP TO HUNT WATERFOWL IN MONTANA DURING THE 1989 HUNTING SEASON:

8. Did you hire a hunting guide or outfitter?
   _____ Yes _____ No

9. Was hunting the main purpose of your trip away from home when you hunted in this area or did you make the trip for other reasons such as business or a family vacation? (please check one)

   ___ Hunting was the main purpose of this trip

   ___ Hunting was one of several reasons for making the trip

10. Which of the following items did you use while hunting waterfowl in this area? (please check all items you used)

___ Decoys ___ Tent

___ Calls ___ Trailer or R.V.

___ Binoculars ___ Camera

___ Boat ___ Spotting scope

___ Waders ___ Retriever

11. If you didn't use a boat, about how far did you walk to get to the area you hunted? (please use an average if you hunted more than a day)

___ Miles

12. About how many other waterfowl hunters (not in your party) did you see while you were hunting this area on this trip?

___ Number of other hunters

13. Was this number of hunters : (please check one)

____ More than I expected to see

____ About as many as I expected to see

____ Fewer than I expected to see

____ I didn't have any expectations

14. Did the other waterfowl hunters present affect your enjoyment of the hunting in this area?

___ Yes ___ No

If yes, please explain how :

_____

15. Was this the first time you hunted waterfowl in this particular area?

___ Yes ___ No, I've hunted here before

15a. If no, how many years have you been hunting waterfowl in this area?

____ Years

16. How many separate trips did you make from your home to this hunting area this season?

___ Separate trips from home this year

17. If you were told you would be unable to hunt waterfowl in this area on this trip, what other area might you have hunted instead?

Please specify general location : _____

18. About how far is it from your home to this alternative hunting location?

_____ Miles

19. The following list gives some of the reasons for choosing an area to waterfowl hunt. What are the most important factors you consider when deciding where to go waterfowl hunting? (please check the box that best reflects the importance of each item).

	Very Important	Important	Not Important	Not at all important
a. Good public access	☐	☐	☐	☐
b. Size of bag limit.	☐	☐	☐	☐
c. High numbers of waterfowl.	☐	☐	☐	☐
d. Close to home	☐	☐	☐	☐
e. Availability of facilities	☐	☐	☐	☐
f. Because I had a special swan permit for the area	☐	☐	☐	☐
g. Proximity to commercial services	☐	☐	☐	☐
h.. To hunt with family or friends	☐	☐	☐	☐
i. Ease of launching boat and bird retrieval	☐	☐	☐	☐
j. Familiarity with the area	☐	☐	☐	☐
k. Low numbers of hunters	☐	☐	☐	☐

20. People hunt waterfowl for many reasons. We'd like to know some of the reasons you hunt, to help us understand different types of hunters and their preferences.

Following is a list of possible reasons for waterfowl hunting. Please check the box that says whether that reason was very important, important, not important, or not at all important.

	Very Important	Important	Not Important	Not at all Important
a. For the solitude	☐	☐	☐	☐
b. To test my hunting skills	☐	☐	☐	☐
c. To shoot a limit of waterfowl	☐	☐	☐	☐
d. To be outdoors	☐	☐	☐	☐
e. For the meat	☐	☐	☐	☐
f. To be in a natural setting	☐	☐	☐	☐
g. To learn more about waterfowl	☐	☐	☐	☐

21. Could you please look back at Question 20 and circle the letters of the **three** most important reasons you hunted waterfowl on this trip?

III. ***THE NEXT FEW QUESTIONS WILL HELP US TO UNDERSTAND THE VALUE YOU PLACE ON WATERFOWL HUNTING IN THIS AREA.***

WE REALIZE YOU AREN'T USED TO CONSIDERING WATERFOWL HUNTNG THIS WAY, BUT PLEASE THINK ABOUT IT AND GIVE US YOUR BEST ESTIMATE!

---

1. About how far is it from your home to where you usually hunt?

   ___ Miles (one-way)

2. How long did it take to travel from your home to this area?

   ___ Hours (include any stops made en route)

3. If you drove, how many other hunters were in the vehicle?

   ___ Number of other hunters

4. About how much did you personally spend on your "**FIRST**" hunting trip during the most recent hunting season? If you can't recall the exact amount, please give your best estimate for each of the following three types of expenses:

   _____ Amount I spent for transportation (gas, car rental, airfare and any other transportation costs)

   _____ Amount I spent on food, beverages, and lodging

   _____ Amount I spent on equipment purchased just for this trip, access or guide fees, and all other expenses

   _____ TOTAL AMOUNT I SPENT ON THIS HUNTING TRIP

5. Suppose that everything about your "**FIRST**" hunt was the same except your trip costs had been $_____ more, would you still have made the trip?

   ___ Yes, I would still have made the trip.

   ___ No. If no, would you have made the trip if your share of the expenses had been **$1.00** more?

      _____ Yes

      _____ No. If no, could you briefly explain why not:

      _____

6. Now imagine that everything about your "**FIRST**" waterfowl hunting trip was the same, except that you saw twice as many birds and the bag limit was more liberal, and your trip cost to visit this site increase by $_____, would you still have made the trip?

   ___ Yes, I would still have made the trip.

   ___ No. If no, would you have made the trip if your share of the expenses had been **$1.00** more?

      _____ Yes

      _____ No. If no, could you briefly explain why not:

      _____

IV. THE NEXT FEW QUESTIONS ASK YOUR OPINION ON DIFFERENT WATERFOWL HUNTING MANAGEMENT OPTIONS.

1. Do you shoot hen mallards?

   Yes _____ No _____

   If yes, check statements that apply to you:

   a. _____ I shoot hen mallards as a regular part of my daily bag.

   b. _____ I shoot hen mallards only to fill out my bag on a slow day.

   c. _____ I shoot hen mallards only by mistake.

2. Check all statements which reflect your attitude toward license costs:

   a. _____ Current duck stamp prices are adequate to maintain waterfowl numbers.

   b. _____ If duck stamp prices increased by $5.00 or more within 5 years, I would pay it, knowing it was necessary to maintain waterfowl numbers.

   c. _____ If duck stamp prices increased by $5.00 or more within 5 years, I would quit hunting.

3. In regard to the steel shot program, check all statements which apply to you.

   a _____ Steel shot constitutes another example of government interfering with my life/enjoyment/recreation.

   b. _____ Steel shot is necessary to reduce waterfowl losses due to lead poisoning.

   c. _____ I like shooting steel shot.

   d. _____ I do not like shooting steel shot.

   e. _____ I still shoot lead shot.

   f. _____ I want to learn more about proper use of steel shot.

4. Relative to hunting regulations, check statements which apply to you:

   a. _____ Present regulations are too restrictive.

   b. _____ Present regulations are in line with current population status.

   c. I would like to see liberalization in :

      1) _____ duck regulations

      2) _____ goose regulations

   d. If regulations were to be liberalized, what area would you like to see: (Please rank 1st, 2nd, and 3rd)

      1) _____ Season length increase

      2) _____ Bag limits increased

      3) _____ Other (Please specify):

      _____

5. Do you perceive there are fewer ducks in your area, and if so, to what do you attribute it? (Check all statements you feel are very important.)

   a. _____ Habitat loss nationally

   b. _____ Habitat loss in my state/area

   c. _____ Overshooting

   d. _____ Disease

   e. _____ Toxic substances, including pesticides, heavy metal, etc.

6. If you do not plan to hunt waterfowl in one or more upcoming seasons, will you continue to buy duck stamps to help waterfowl conservation programs?

   _____ Yes _____ No

7. Please check the statements which reflect your attitudes about half-hour before sunrise shooting (HHBSRS) for ducks and for geese:

	DUCKS	GEESE
a. HHBSRS is an important part of my waterfowl hunting tradition	_____	_____
b. HHBSRS is necessary to a successful day's hunt, at least some days	_____	_____
c. HHBSRS is necessary to an enjoyable day of hunting	_____	_____
d. HHBSRS is unimportant to me in hunting	_____	_____
e. HHBSRS should be curtailed since hunters cannot see birds well enough for proper identification	_____	_____
f. HHBSRS should be curtailed to reduce the harvest of some species which need more protection	_____	_____

V. *THESE LAST FEW QUESTIONS WILL HELP US UNDERSTAND YOUR RESPONSES BY KNOWING SOME BASIC INFORMATION ABOUT YOU:*

1. Where are you from? City: _____ State : _____

2. What is your age? _____ Years

3. Are you: _____ Male _____ Female

4. Are you a member of any hunting, conservation, or sport organizations?
___ Yes ___ No

4a. If so,which one(s)?_____

5. What is the highest year of formal education you completed?

___ Some grade school ___ Some college
___ Finished grade school ___ Finished college
___ Finished junior high school ___ Some postgraduate work
___ Finished high school ___ Finished postgraduate

6. If you had not gone hunting this trip, would you have been working ?

___ Yes ___ No

7. During the hunting season this year, were you ? (check one)

___ Employed full time ___ Retired
___ Employed part time ___ Homemaker
___ Unemployed Other : _____

8. Please check your household's income before taxes last year :

___ Under 5,000 ___ 20,000 - 24,999 ___ 40,000 - 49,000
___ 5,000 - 9,999 ___ 25,000 - 29,999 ___ 50,000 - 74,999
___ 10,000 - 14,999 ___ 30,000 - 34,999 ___ 75,000 - 100,000
___ 15,000 - 19,999 ___ 35,000 - 39,999 ___ over 100,000

Thank you for your help. This information will be held in strict confidence and will be used for mangement purposes only. Is there anything else you'd like to tell us about hunting in this area? We would appreciate any comments: